

REMARKS

Applicants have studied the Office Action dated February 14, 2005 and have made amendments to the claims. It is submitted that the application, as amended, is in condition for allowance. Claims 1 and 6 are amended. Claims 20-26 are canceled. Claim 27 is new. By virtue of this amendment, claims 1-10, 15, 17 and 27 are pending. Applicants have made two small editorial changes to the specification to correct grammatical errors and to enhance readability. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

(1-2) The Examiner rejected claims 1, 2, 4, 17, 20, 21 and 23 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al., (U.S. Pat. No. 4,942,554), hereinafter "Kircher", in view of Jang et al., (U.S. Pat. No. 5,637,529), hereinafter "Jang". Applicants have amended independent claim 1 to more clearly and distinctly recite the present invention. Claims 20, 21 and 23 are canceled.

The Applicants respectfully disagree with the analysis of the Examiner. The process according to the invention comprises, in summary, the successive steps of:

amorphizing the single-crystal lattice around a periphery of the recess,
depositing a layer of amorphous material,
thermally annealing the amorphous material.

The order of the steps is very important. The sequence of the steps cannot be deduced by the combining the teaching of Kircher and Jang for the following reasons.

Jang relates to a method for forming in a trench 39 an element isolation insulating film 45 of a semiconductor device. Jang teaches the formation of an amorphous region 43, after the formation of the trench, in order to remove the lattice defects occurring upon forming the trench, followed by a SPE process to crystallize the amorphous region. Then, after the re-crystallization of the amorphous region 43, the element isolation insulating film 45 is formed in the trench.

The three-dimensional, one-transistor cell arrangement of Kircher has a depression 6 and a layer of silicon oxide 7 that functions as an insulation or insulating layer (see column 4, lines 1-5 and column 5, lines 66-68 of Kircher). A layer of amorphous silicon 8 is deposited on the surface of the substrate and on the layer of silicon oxide 7.

Applicants disagree with the Examiner that "it would have been further obvious in the method of Kircher and Jang that the depositing the layer of the amorphous material would be performed directly on the structure obtained after amorphizing in order to take advantage of the amorphization of Jang and the amorphous layer of Kircher before any annealing step is performed".

It is not obvious that the depositing of the layer of the amorphous material would be performed directly on the structure obtained as a result of amorphizing, because it goes against the teaching of Jang to re-crystallize, prior to depositing the amorphous silicon, the structure obtained as a result of amorphizing. Jang teaches that the layer of amorphous silicon 8 of Kircher must thus be deposited subsequent to the re-crystallizing step. This is because Jang teaches re-crystallizing its amorphous region 43 prior to constructing its element isolation insulating film 45 (see claim 1 of Jang, at column 4, lines 21-24 of Jang). Therefore, the Kircher-Jang combination teaches to first re-crystallize the structure obtained by amorphizing, and, thereafter, to deposit a layer of amorphous material. The Kircher-Jang combination teaches a method having a different set of steps than the method in accordance with the invention. The method in accordance with the invention comprises a set of steps essentially in contradiction to the steps of the Kircher-Jang combination. The method in accordance with the invention first deposits a layer of amorphous material, and, thereafter, crystallizes the

structure obtained by amorphizing.

Amended claim 1 now specifically recites in the preamble that its steps are performed **successively**, in order to emphasize the importance of the sequence of the steps, and step c) of amended claim 1 now recites as follows,

"c) **prior to any thermal annealing**, depositing a layer of amorphous material having the same chemical composition as that of the substrate directly on the structure obtained after amorphizing produced in step b" [emphasis added].

The conclusion suggested by the Examiner regarding that which the Kircher-Jang combination teaches is based on an **a posteriori** approach, which is an incorrect approach that uses present-day knowledge of the applicants' invention and then looks back in time. Without knowledge of the applicants' invention, it cannot be deduced from the teaching of Kircher and Jang, to deposit a layer of amorphous material on an amorphized structure before re-crystallization.

In view of Jang, a person skilled in the art who forms an amorphous region, after the formation of the trench 6 of Kircher, crystallizes the amorphous region prior to depositing the silicon oxide 7. In Kircher, after the silicon oxide 7 is deposited, the layer 8 of amorphous silicon is deposited. Thus, the subsequent crystallization of Kircher's layer 8 of amorphous silicon cannot be performed on an amorphized structure, but has to be performed on an already re-crystallized structure.

Accordingly, in view of the amendments and remarks above, Applicants believe that the rejection of claims 1, 2, 4 and 17 under 35 U.S.C. §103(a) has been overcome. Applicants request that the Examiner withdraw the rejection of claims 1, 2, 4 and 17.

(3) The Examiner rejected claims 3, 5, 22 and 24 under 35 U.S.C. §103(a) as being unpatentable over Kircher in view of Jang, and further in view of Tan et al., (U.S. Pat. No. 6,001,706). Claims 3 and 5 depend upon amended claim 1, and because dependent claims recite all the limitations of the independent claim, it is believed that claims 3 and 5 also recite in allowable form. Claims 22 and 24 are canceled. Accordingly, in view of the amendments and remarks above, Applicants believe that the rejection of claims 3 and 5 under 35 U.S.C. §103(a) has been overcome. Applicants request that the Examiner withdraw the rejection of claims 3 and 5.

(4) The Examiner rejected claims 6-10, 15, 25 and 26 under 35 U.S.C. §103(a) as being unpatentable over Kircher in view of Jang, and further in view of Lill et al., (U.S. Pat. No. 6,074,954), and Numazawa et al., (U.S. Pat. No. 6,168,996). Claim 6 is amended to correct a minor typographical error. Claims 6-10 and 15 depend upon amended claim 1, and because dependent claims recite all the limitations of the independent claim, it is believed that claims 6-10 and 15 also recite in allowable form. Claims 25 and 26 are canceled. Accordingly, in view of the amendments and remarks above, Applicants believe that the rejection of claims 6-10 and 15 under 35 U.S.C. §103(a) has been overcome. Applicants request that the Examiner withdraw the rejection of claims 6-10 and 15.

(5) In response to the possible future objection under 37 CFR 1.75 raised by the Examiner, applicants have canceled claims 20-26.

(6) Applicants thank the Examiner for reviewing and accepting the terminal disclaimer filed on January 10, 2005.

(7-8) Applicants thank the Examiner for reviewing their previous arguments, and request that the Examiner carefully review applicants current argument, which is different than the arguments that applicants previously submitted.

CONCLUSION

In this Response, Applicants have amended certain claims. In light of the Office Action, Applicants believe these amendments serve a useful clarification purpose, and are desirable for clarification purposes, independent of patentability. Accordingly, Applicants respectfully submit that the claim amendments do not limit the range of any permissible equivalents.

Applicants acknowledge the continuing duty of candor and good faith to disclosure of information known to be material to the examination of this application. In accordance with 37 CFR §1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment are limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this amendment by the Applicants and their attorneys.

Applicants respectfully submit that all the grounds for rejection stated in the Office Action have been overcome, and that all claims in the application are allowable. No new matter has been added. It is believed that the application is now in condition for allowance, which allowance is respectfully requested.

PLEASE CALL the undersigned if that would expedite the prosecution of this application.

Respectfully submitted,

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